

WHAT IS CLAIMED IS:

1. A longitudinal magnetic recording medium,  
comprising:

a non-magnetic substrate;

5 a plurality of underlayers formed on the non-magnetic  
substrate; and

a magnetic layer formed on the non-magnetic  
substrate via the plurality of the underlayers,  
the magnetic layer comprising

10 a lower magnetic layer containing at least one of  
Ru or Re in an amount of not less than 3 at% to  
not more than 30 at%, and Cr in an amount of  
not less than 0 at% to not more than 18 at%,  
and further containing at least one of B or C  
15 in an amount of not less than 0 at% to not more  
than 20 at%, and the balance being made up of  
Co, and

an upper magnetic layer containing Co as a main  
component, anti-ferromagnetically coupled with  
20 the lower magnetic layer via a non-magnetic  
intermediate layer.

2. The longitudinal magnetic recording medium  
according to claim 1, wherein the plurality of the  
underlayers comprise a non-magnetic and amorphous  
25 structured first underlayer containing Co or Ni as a  
main component, and a body-centered cubic structured  
second underlayer containing Cr.

3. The longitudinal magnetic recording medium

according to claim 1, wherein the plurality of the underlayers comprise a first underlayer having a B2 structure, and a body-centered cubic structured second underlayer containing Cr.

5           4. The longitudinal magnetic recording medium according to claim 1, wherein at least one layer of the plurality of the underlayers is made of a non-magnetic and hexagonal close-packed structured alloy material containing Co.

10           5. The longitudinal magnetic recording medium according to claim 4, wherein the underlayer made of the non-magnetic and hexagonal close-packed structured alloy material containing Co is formed between the lower magnetic layer and the second underlayer.

15           6. The longitudinal magnetic recording medium according to claim 4, wherein the underlayer made of the non-magnetic and hexagonal close-packed structured alloy material containing Co is made of a Co-Ru alloy containing Ru in an amount of not less than 35 at% to  
20 not more than 60 at%.

          7. The longitudinal magnetic recording medium according to claim 5, wherein the underlayer made of the non-magnetic and hexagonal close-packed structured alloy material containing Co is made of a Co-Ru alloy  
25 containing Ru in an amount of not less than 35 at% to not more than 60 at%.

          8. The longitudinal magnetic recording medium according to claim 1, wherein at least one layer of the

plurality of the underlayers is made of a body-centered cubic structured alloy material containing Cr, and the Cr alloy contains B in an amount of not less than 2 at% to not more than 15 at%.

5           9. The longitudinal magnetic recording medium according to claim 2, wherein at least one layer of the plurality of the underlayers is made of a body-centered cubic structured alloy material containing Cr, and the Cr alloy contains B in an amount of not less than 2 at% to not more than 15 at%.

10           10. The longitudinal magnetic recording medium according to claim 3, wherein at least one layer of the plurality of the underlayers is made of a body-centered cubic structured alloy material containing Cr, and the Cr alloy contains B in an amount of not less than 2 at% to not more than 15 at%.

15           11. A magnetic storage apparatus, having:  
a magnetic recording medium, a driver for driving it in the recording direction, a composite head having an inductive magnetic head for recording and a spin-valve type magnetic head for reading in combination, a means for causing the head to perform relative movement with respect to the medium, and a read / write signal processing means with respect to the head; wherein

20           the magnetic recording medium, comprising:

a non-magnetic substrate;

a plurality of underlayers formed on the non-magnetic substrate; and

a magnetic layer formed on the non-magnetic substrate via the plurality of the underlayers, the magnetic layer including a lower magnetic layer containing at least one of Ru or Re in an amount of not less than 3 at% to not more than 30 at%, and Cr in an amount of not less than 0 at% to not more than 18 at%, and further containing at least one of B or C in an amount of not less than 0 at% to not more than 20 at%, and the balance being made up of Co, and an upper magnetic layer containing Co as a main component, anti-ferromagnetically coupled with the lower magnetic layer via a non-magnetic intermediate layer, and

the plurality of the underlayers comprising a non-magnetic and amorphous structured first underlayer containing Co or Ni as a main component, and a body-centered cubic structured second underlayer containing Cr.

12. The magnetic storage apparatus according to claim 11, wherein the plurality of the underlayers of the magnetic recording medium comprise a first underlayer having a B2 structure, and a body-centered cubic structured second underlayer containing Cr.

13. The magnetic storage apparatus according to claim 11, wherein at least one layer of the plurality of the underlayers of the magnetic recording medium is made of a non-magnetic and hexagonal close-packed

structured alloy material containing Co.

14. The magnetic storage apparatus according to claim 13, wherein the underlayer made of the non-magnetic and hexagonal close-packed structured alloy material containing Co of the magnetic recording medium is formed between the lower magnetic layer and the second underlayer.

15. The magnetic storage apparatus according to claim 13, wherein the underlayer made of the non-magnetic and hexagonal close-packed structured alloy material containing Co of the magnetic recording medium is made of a Co-Ru alloy containing Ru in an amount of not less than 35 at% to not more than 60 at%.

16. The magnetic storage apparatus according to claim 11, wherein at least one layer of the plurality of the underlayers of the magnetic recording medium is made of a body-centered cubic structured alloy material containing Cr, and the Cr alloy contains B in an amount of not less than 2 at% to not more than 15 at%.

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